

Earth Science

Rockhounds' NATIONAL Magazine



James O. Montague, 1877-1956. (See page 5.)

35¢

May-June, 1956

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- "BY LOUIS BROMFIELD" *
"Dear Hi," wrote the famous author, not long before his recent lamented death, to this humble scribe, "Of course you are welcome to make a reprint of anything I've ever written." (*One of the distinguished features arranged for our "10th Anniversary" July-August issue.)

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EDITOR'S MEMO PAD

AS WE TRAVEL about the country visiting our rockhound friends, we find many beautiful and admirable collections of minerals, and "what have you." Indeed, we have come to the conclusion that most collectors are "born, not made." In other words, collecting seems to be something that is in their blood.

Consequently, in their collecting proclivities, more frequently than not, folks do not confine their ingathering activities to minerals alone, but quite likely they will take on most anything else, as a side line, that seems to be of interest to them. Perhaps, this is as it should be, and is something that should warrant encouragement, as it may often prove to be a good antidote for boredom.

While these diversifications are of course perfectly legitimate and acceptable, we must admit that some of them are more closely related to our objectives than others. If we were asked to comment upon the point in question, and to make some suggestions on a few of the more desirable or closely related "side lines" which our mineral minded friends may pursue with profit, we think, perhaps, we should like to name them in the following order.

Without doubt the lapidary arts could and should come first. This is so evident that we need say no more about it. Gemology also, if one can afford it, comes in the same class. Next in order, we would say, should come such specializations as micro-mounts, petrified woods, fluorescence, etc., which scarcely could be called anything other than the general run of collecting. Usually we collect what comes easiest, and that more often than not is a matter of location. Your location, as well as that of the mineral location.

Paleontology, or the collection and study of past life on the Earth, as revealed by the fossils, is one of the most satisfying and productive side-line efforts with which we are acquainted. Indeed, there are few collections that do not have some fossil specimen in them. We cannot recommend it too highly. As to its possibilities, there seems to be absolutely no end.

Somewhat related, as it affects human existence and history during past ages, is the study and collection of ancient artifacts—"Indian rel-

ics" to most of us. In this, the study of archeology, one finds a close correlation between mineral properties and the uses which early man made of them. There is scarcely a collection large or small that does not have its representation of Indian arrowheads and stone axes. As an adjunct to our avocation this diversion may prove very rewarding.

Then again, there is the study of meteoritics, or "minerals from heaven," out of this world for those who can afford them; and also the collection of shells of all kinds, once very popular among collectors who called themselves conchologists (students of shells), which is closely related to invertebrate paleontology.

Finally, there are those who go in for the collection of various types of art objects done in ivory, crystal, or jade, etc., usually those who are able to spend money freely for these beautiful objects of art.

And now may we close by saying, this is about it, please make your own choice, for with any of these avocations as a side-line you certainly cannot go far wrong.

*

How A Museum Should Be Built

HAROLD MADISON, once Director of the Natural History Museum of Cleveland, when asked "How A Museum Should Be Built," is quoted as saying:

"Everyone should enter through a planetarium, because the 'stately firmament is the back-drop to the whole drama of our lives.' Thence he should proceed to the Hall of Geology, or the House of Earth, where he should see the work of creation as it proceeds on this terrestrial ball—the work of wind and water and fire, the laying down of the foundations of the earth, the disposition of minerals, the building of soil, erosion, the rise and fall of continents, the processes of isosity, together with all of the gadgets that men have evolved for measuring time and space, and carrying on navigation.

"From the House of Old Mother Gea, he should move on to the Hall of Biology or the House of Life, where he should walk the long road of evolution in a fore-shortened and dramatic form. And from the Hall of Biology, he should come to that of Anthropology or the

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House of Man, and thence to the Hall of History (or His Story) and, at the far end of that, he should sprawl out into the whole set of 'fingers' devoted to the various arts and sciences."

What a picture for some great museum of the future, where a semblance of order will supersede the whole gamut of unplanned confusion which predominates in most of our so called modern museums of today! Like Topsy, they have just grown up in a Humpty-Dumpty sort of a way, and in spite of all the ingenuity of their capable directors, there is not much hopes of ever bringing order out of chaos.

IN MEMORIAM

JAMES O. MONTAGUE, 1877-1956



JAMES O. MONTAGUE, nationally known amateur geologist, passed away in Milwaukee on March 1, 1956. He was born March 18, 1877, at Lima, Ohio, and was buried in Milwaukee. He is survived by his widow Kathryn, one son and three daughters.

"Jim," as he was affectionately known by all of his friends, was a man of kindly heart, quiet dignity, and an intellectual capacity far exceeding that of the average individual.

Geology for "Jim" was not just a passing fancy, but a serious and lifelong avocation. He was not only an ardent paleontologist, in which field he perhaps made his greatest contribution

to science, but also an expert mineralogist as well. He was especially interested in the "minerals of the soil," with which he was so closely associated in his vocation, the fertilizer industry, for the greater part of his life.

In recognition of his splendid work in Paleontology, where he specialized in the Trilobita, he was highly honored by the Board of Trustees of the Milwaukee Public Museum in 1949, being appointed Honorary Curator of Geology. He was also an early president of the Wisconsin Geological Society, and one of the organizers and a past president of the Midwest Federation of Geological Societies. Serving as chairman of two notable conventions of the Midwest Federation, held in Milwaukee, and many of its important committees and divisions, it can very truthfully be said that few if any of its members have made a greater contribution to its success and welfare.

He was frequently in demand as a speaker before clubs and society meetings, and was especially interested in working with young people and students, where he did much good work in his local society. Also, as Life Member and an Associate Editor of *EARTH SCIENCE*, he contributed many splendid articles to its pages, as well as to other publications and society Bulletins, including *The Trilobite*, of which he was a faithful editor for many years.

His philosophy of life may perhaps best be summed up in the closing remarks of his last public address, before the students at Carroll College, February 8, 1956, when he said:

"God has a plan for you and has prepared a special place for you in His Divine Order of Creation. He expects you to leave the world a little better for having lived in it."

These are memorable words, which Jim would like to leave with all of us.

—BEN HUR WILSON, *Editor*

John H. Melvin, Chief, Division of Geological Survey, Department of Natural Resources, announces the beginning of a survey of the mineral collecting localities of Ohio. This project is directed toward the study of mineral occurrences where the amateur mineral hobbyist can find collection quality stones. Since no previous attempt has been made to gather this information into one main source, the data is scattered throughout the State in the notebooks and collections of mineral enthusiasts.

Mineral collectors whose names have appeared in published articles or who are known to the Survey have been notified. However, the majority of Ohio remains uncontacted and unsurveyed. As it is the active mineral collector who knows the true conditions under which minerals are found, the Survey is asking all those willing to assist in this project by sending in information for Survey files (credit will be given to the source of information) to write to The Division of Geological Survey, Room 106, Orton Hall, The Ohio State University, Columbus 10, Ohio. When sufficient data has been assembled, the results will be published in booklet form.

MINERAL SCIENCE INSTITUTE

— PRESENTS —

A HOME STUDY COURSE IN MINERALOGY

Take advantage of your leisure hours and let us help you acquire that basic knowledge of minerals that will bring some real meaning to your hobby of collecting rocks and minerals. Don't just fill your basement with rocks and then not be able to tell your friends what they are and how they were formed. With only a fragmental knowledge you may overlook something very important while out collecting. This hobby is rapidly becoming one of the largest in the entire country, and it is one in which the whole family can participate. Clubs are being formed in every state. If you are going at this hobby blindly it is never too late to take a fresh start. Write for our free, illustrated brochure to the—

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DESK 5

159 East Ontario St., Chicago 11, Ill.

Earth Science

MAY-JUNE, 1956

Vol. 9, No. 3

Man and the Mastodon in Missouri

by C. HELMER TURNER

MASTODON is the name given to those extinct allies of the elephants in which the teeth are of the browsing type, composed of low crests and nipple-like cones, and not of the grazing type, composed of high, flattened plates, as in the mammoths and elephants. The word is from the Greek *Mastos* meaning breast and *Odont* meaning tooth.

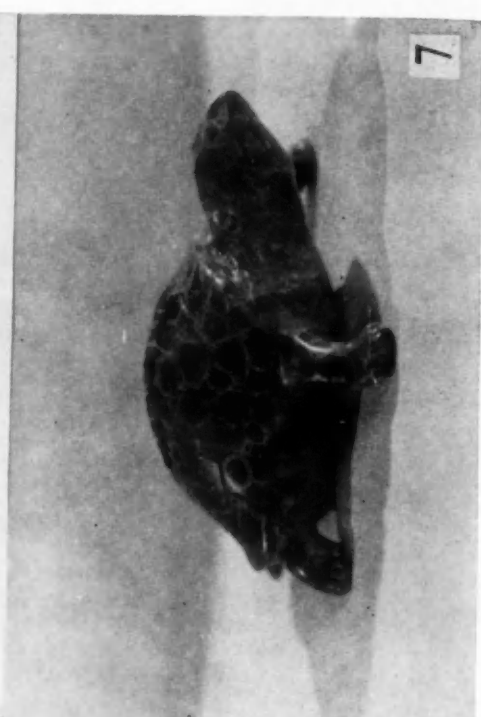
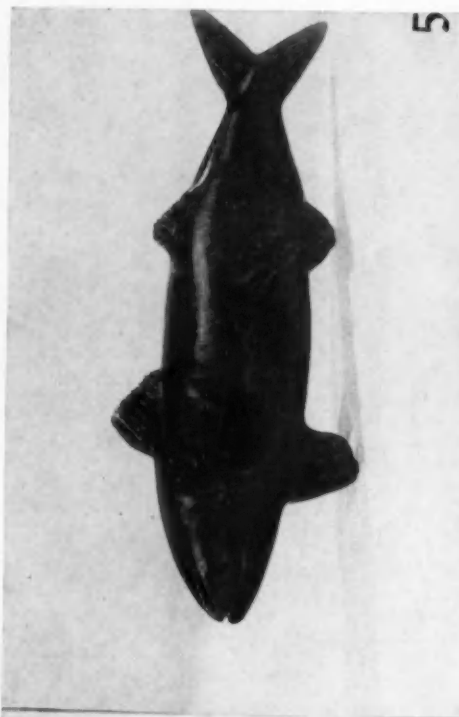
The earliest reported mastodon skeleton was found in 1613. Some men working in a sand quarry near Daupheny, France, dug up the bones which were purchased by a surgeon named Mazuyer. This man arranged the bones to look like the skeleton of a giant man and displayed them as the bones of the legendary king Teutobocchus. They were later mounted in accordance with the way they best fitted together and discovered to be those of a large mammal similar to an elephant. (4).

Since early colonial days, mastodon bones have been found, from time to time, on the North American continent. In this country the first reported skeleton, nearly complete except for the head, was found in 1801, near Newburgh, New York. In 1838, a head was found in Ohio. (9). Later, in October of 1838, Mr. Albert C. Koch dug up a large number of mastodon bones from a spring in the Bourbeuse River bottom in Gasconade County, Missouri. These and other bones which he collected from Benton and Jefferson counties, Missouri, and from other states, were placed on display in the St. Louis Museum, of which Mr. Koch was proprietor. At one time, so he states, he had more than six hundred teeth of mastodons of different ages and sexes, five skulls, a large number of tusks of all sizes, numerous other bones and the nearly complete skeleton described by him under the name of "Missourium." (15).

The bones in this display, which was later moved to other cities in the United States as well as to foreign countries, were examined by many noted scientists of that time and were the cause of much comment for many years thereafter. Even now, questions concerning the circumstances connected with the finding of these bones occasionally arise among geologists and archaeologists. This article is an attempt to answer some of these questions by quoting from parts of Mr. Koch's writings and from the writings of some of his contemporaries. Space will not permit quoting these in full but it is necessary to quote some of Mr. Koch's wording to explain later comments about them.

Mr. Koch (or Dr. Koch, as he called himself after 1843,) apparently wrote a new and revised description of the bones each time he took them to a new place for display. There are articles by him with similar titles published in St. Louis, 1841, Louisville, 1841, London, 1842, Dublin, 1843, and Berlin, 1845. One of the earliest, if not the first, account was published in the *Philadelphia Presbyterian* of January 12, 1839, and reprinted in the *American Journal of Science* later in the same year. (11). The substance of this article is as follows: A Gasconade County farmer, while improving his spring, in the Bourbeuse River bottom, found some large bones. (The location is given as "lat. 38° 20' N., lon. 92° W." but a check of the map shows that this location would be in Osage County, 25 miles from the Bourbeuse River. It would be on the Maries River a few miles from a place where some mastodon bones were found four or five years ago.) Mr. Koch, on learning of these bones, went to the farm and found, as well as the bones, a knife made of stone. He immediately started opening a larger hole which he describes as follows: "the first layer . . . was vegetable mould, then a blue clay, then sand and blue clay." He also found many stones varying in weight from two to twenty-five pounds, "evidently thrown there with the intention of hitting some object." Below these stones he came to a layer of vegetable mould on the surface of which he found the "first blue bone, with this a spear and axe" also ashes from six to twelve inches deep "intermixed with burned wood, and burned bones, broken spears, axes,

(Continued on page 15)



The Carving Trend

by JOHN F. MIHELICIC

VARIETY is the spice of life. This philosophy is being accepted by more and more lapidary artists. The mechanical competence that is gained in the basic techniques of cabochon and facet cutting is readily carried over into the creative field of carving. Certainly, the wonderful carvings of many centuries are an inspiration to an increasing number, with the result that our convention displays are showing quite a few well executed art objects. Paul Zammit of Detroit has shown a remarkable

skill in both original and duplicate carving in shell, alabaster, petoskey stone, obsidian and jade mediums. These he displayed at the 1955 Midwest convention.

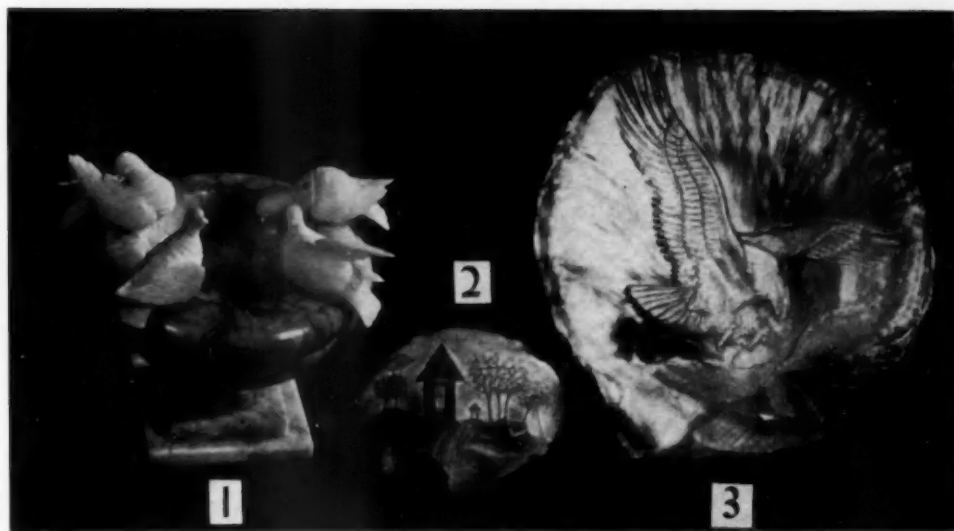
Just who started carving and when is a moot question. But, in my experience, miners in different parts of the country have utilized ores to create miniatures of tools, animals, books, etc. Certainly the number of "books" that quarry men have cut from marbles, soapstones and alabaster is amazing. We still have a book that we bought in the early '30's from a wayside worker near the Kentucky caves. My uncle made a variety of miniature objects from mass copper and silver and copper halfbreeds which were so precisely duplicated that I marvelled at the delicate touch of a big strong blacksmith. Certainly, Squire Riley of Rosiclare, Illinois, became known far and wide for his beautiful fluorite creations. Here in Michigan quite a bit of carving is done in alabaster and petoskey stone.

The tools that you could use in carving are of your own choosing and adaptation.

ILLUSTRATIONS

1. *Birdbatb* —Michigan Alabaster
2. *Oriental Scene*—Shell (source unknown)
3. *Eagle* —Tabitan shell
4. *Alligator* —Jade
5. *Fish* —Obsidian
6. *Hippo* —Obsidian
7. *Turtle* —Michigan petoskey stone

By courtesy of Paul Zammit, photographer and professional retouch artist, Detroit. All objects pictured were created by the artist.



Paul Zammit started cutting a Tahitan shell that we got from Joe Phetteplace with whatever tools he had at hand. As he ventured into carving other shells and stones, he added more tools, such as small self-charged diamond wheels, small grinding wheels and burrs, sanders and felts. Many dental tools are in his kit, along with other hand tools which he made. While he wisely

followed many of the published techniques, he was by far too much of an individualist not to chart his own path in tools and procedures—just as you would.

Why not venture forth into this inspiring part of lapidary art? Carving material is available in every state—waiting for you to convert into expressions of your personality.

The Binghamite Story

by LE ROY V. PETERSON

AWAY BACK in the summer of 1936, Bill Bingham* and his son James were roaming around the mines of the Cayuna Range, near Crasby and Ironton, Minnesota, looking for agates on the mine stripping dumps. Hunting not being particularly good that day, they decided to go down in one of the open pit mines and give it the once over. It was Sunday so there was no mining activity.

Near a steam shovel at the mine face were several large chunks (a couple of tons each!) of quartz looking material that had been thrown aside for later removal to the waste dump. These looked interesting even though covered with iron ore and clay, as they showed bright red and yellow areas on freshly broken surfaces. A couple of pieces were broken off and put in the collecting bag.

Later on during the winter, Bill finally got around to sawing up some of this material and found it very beautiful and different. Several cabachons were made and some small pieces were spot polished, but he couldn't identify it with any rocks or mineral known to him.

These specimens and cabachons were shown at one of the meetings of the Minneapolis Mineral and Gem Club, where they created a great deal of interest. The experts there were also stumped as to its identification. Many members checked into

the literature but with no results.

During that winter some one proposed calling this new material Binghamite, after its discoverer. The club went along on this idea and it has been so called ever since and it now is known and desired from coast to coast.

Diligent searching by club members, both the Minneapolis Mineral and Gem Club and the Minnesota Mineral Club, has turned up Binghamite in places in the Arco mine as well as the original find in the Evergreen mine (now the Portsmouth). It has also been found on several waste dumps. There are two known pebbles of Binghamite that were found in the glacial drift, one near Little Falls, Minnesota, and one near Hastings, Minnesota, having been transported many miles away from its in-situ locale.

Binghamite is formed in quartz veins cutting the iron formations in these two known places. It is a crystalline quartz replacement of fibrous goethite (just as tiger-eye is a quartz replacement of asbestos (crocedalite) and occupies only a small portion of these quartz veins. It is associated with veinlets of hematite, limonite and goethite. It is colored red by finely divided hematite and yellow by limonite. It is identified by the fact that the fibers are straight or very slightly curved but not wrinkled as in tiger-eye.

In cutting Binghamite, the fibers should be oriented parallel to the flat back of cabachons or parallel to a flat polished surface. This will give a nice "cats-eye" effect on well rounded surfaces, as the sides of the fibers afford good reflecting surfaces whereas the ends of the fibers absorb a great deal of light, causing them to appear very dark.

Good solid cutting material is quite scarce and slabs containing over 3 or 4 square inches of continuously good cutting material are exceptional. Any good lapidary procedure for quartz will produce good results with Binghamite, since with proper preparation it will take a perfect polish.

There are several people who are planning to have Binghamite for sale at the National show and exhibition in St. Paul, Minnesota, on July 12-15, 1956.

*Alias William J. Bingham, President of the Midwest Federation of Mineralogical and Geological Societies.



WILLIAM J. BINGHAM

Nothing pleases the editor more than to be able to present our readers with a little thumbnail biography of WILLIAM J. BINGHAM, of St. Paul. Few men in "Midwest" circles have contributed more of their talents, and more freely

of their time and energy than "Bill" Bingham, who is now its very efficient president.

He is a native of Minnesota, and has lived in the Twin Cities ever since 1906, when as a child he moved to St. Paul with his parents. He worked 27 years at mechanical and electrical engineering, designing various kinds of machinery and equipment, finishing up as chief engineer of a diamond core drill manufacturing company.

He spent 15 months on active duty in World War I Army Aviation as airplane pilot and 4 years in World War II Air Force, ending up as a Major, serving in the defense of the Panama Canal.

Photography was his first hobby, and radio was his second, and he became seriously interested in the geological sciences about 1910, with a chance meeting of a geologist who explained to him the geology of the Mississippi River Gorge at St. Paul. He took up lapidary work in 1929, at a time when there were no instruction books available, so it was necessary for him to do a tremendous amount of experimental work to develop suitable processes. This work is still going on.

During the period between 1930-1940, he took all of the available courses in Geology, Mineralogy and Paleontology at the University of Minnesota, and between 1946 and 1950 he completed the course given by the Gemologic Institute of America, becoming a Certified Gemologist.

He has been an active member of the Minnesota Mineral Club, serving as their president for the years 1945, 1946 and 1947.—B.H.W.

OUR ROCKS IN BLOOM

*Our rocks, they bloom
No matter where they're placed,
Be it in a show case
Or by the garden gate.*

*They need no fertilizer,
Nor rain, nor hoe,
They just keep blooming
On through eternity.*

*You find them blooming
In all colors gay,
With lakes and rivers
Amidst their beauties rare.*

*No artist's brush will ever
Paint a canvas aglow,
What God's great hand
Has placed within the rocks.*

*I tramp the hills and mountains high
And there I find
Beauty, health and peace—
Within His Garden Land.*

—MRS. EDNA BLANCHE KILBORN,
Kimberly, Idaho.

INDIAN "GOD OF PEACE"

VISITORS who attend the Midwest-American Convention in the Twin Cities in July,

will have the opportunity of viewing the very famous Indian Statue, "God of Peace," done in beautiful white mottled Mexican Onyx, located in the foyer of the City Hall and Court House in St. Paul. Those who have seen it say that it is well worth the effort of a special trip to the Twin Cities.

Carved by the famous sculptor Carl Milles, as a War Memorial to the Veterans of Ramsey County, it depicts a group of Indians crouched about their council fire smoking the pipe of peace. The smoke arising heavenward takes the form of an Indian God of Peace, one hand holding a peace pipe, the other extending in a gesture of friendliness symbolic of the thought that out of conference and understanding comes the hope of peace of the world. Almost without exception, all those who look at the statue seriously and contemplate its meaning, cannot but be profoundly impressed with its significance.

Standing at the end of Memorial Hall, furnishing a magnificent and impressive setting, which is approximately 21 feet wide, 41 feet high and 85 feet long, the famous work of art catches the eye from a focal point 80 feet away, when one enters the building. Weighing more than 60 tons, the statue stands 36 feet high, about the same as a three story building.

The Hall itself is a room of unusual beauty and architecture. The customary columns or pillars have been abandoned, and in their place there extends from each side a series of buttresses. The floor is light marble, illuminated by concealed lights placed in the face of the buttresses about eight feet from the floor. The walls of the hall and of the piers are of Blue Belg marble, a black marble with a white vein. The ceiling is of gold etched mirror.

Installed at a cost exceeding \$75,000, the statue also has another unique feature. Standing on the turntable ten feet in diameter, which would easily turn a locomotive, the statue is revolved through an angle of 132° — 66° on each side of the meridian, requiring two and one-half hours for one complete turn.

—B.H.W.



PROSPECTING AT WARD'S

One of the outstanding geological areas of the United States has been overlooked in the literature covering "where to hunt for specimens," except in the advertisements of various publications for the rockhounds. I am calling your attention to an experience which all rockhounds should take advantage of, if they are near Rochester, New York, i.e., a personal visit through Ward's Natural Science Establishment.

As you enter the building you probably will be greeted by Mr. Dave Jensen, who will ascertain your desires or geological requirements. If you are carrying specimens

the fluorescent mineral dark room. You are given a tray if you desire it and you start high grading Ward's stock. Prices are on every piece. Employees stay at discreet distances but are always available for help, directions and questions. If you pick graded samples out of boxes marked 25 cents, 50 cents, \$1.00, your word is the law when it comes time to settle up. There are no "keep out" signs. If you think prices are too high, take a second look and you'll see that "high prices" material is "high grade" material. You cannot possibly be "gyped" because you yourself are making the decisions and balancing the prices against the quality.



View of recently completed addition to WARD'S NATURAL SCIENCE ESTABLISHMENT, Inc., occupied for the first time in 1952. Main building shown to the extreme right.

which you are unable to identify, you will meet in Dave "a textbook wired for sound," and in a very short time you probably will know just what you have and where they came from. Localities aren't always necessary in Dave's analysis. Ward's paleontologist, Mr. Fred C. Amos, will welcome you in his department with the same hospitality.

Then the fun begins. You are introduced into four rooms containing hundreds of drawers, racks and cases of classified material. One for minerals, one for fossils, one very large supply room in which are stored "mine run" materials, and educational specimens in all sizes and shapes, and

Your final bill will be the summation of the price tags, seldom less, never more. Ward's also have to make a living at this business.

If you leave without spending a cent you don't pass under Geiger counters and magnetometers or between an X-ray machine and a fluorescent screen to determine if you are honest. You take leave with the same friendliness as if you have purchased \$1,000 worth of material.

It's a wonderful experience for a rockhound and I suggest you try it sometime.—
W. L. HOFF, 4739 Forest Avenue, Downers Grove, Illinois.

"16 TONS AND WHADDAYA GET?"



Crane setting limestone blocks into sea-wall at Diversey Parkway and Lake Michigan in Chicago. Blocks are often set in tiers, as in the picture, or they are piled at random.—*Chicago Tribune* photo.

Load 16 Tons and whaddya get? Two more stones on Chicago's break-water.

For years we have watched and wondered as these big cubes of limestone were piled into a protective wall which stretches 20 miles along the lake front; and when the latest batch recently began to appear on the filled-in land in front of the Edgewater Beach hotel, we got in touch with Robert A. Black, chief engineer for the park district.

"What are those stones?" we asked. "Where do you get them and how are they shipped?"

"They are Indiana limestone," he said, "and we're getting them now from around Bloomington, Indiana. Each stone weighs from 4 to 10 tons. They come from an upper stratum of rock which is not good enough for building purposes, but is ideal for ours. We began using them about 30 years ago, and they can take any punishment the wind and water give them. They do not split. If one gets shoved out of place, we need only move it back. A cement breakwater, on the other hand, would require constant repairs.

"Besides, we like the rustic appearance of the

big boulders piled along the shore. It looks sort of parklike.

"When this rock is quarried, a channeling machine cuts it out in strips 4 feet wide and sometimes 50 feet long. These are loaded on flat-cars, where they are split, by drills and wedges, into blocks from 4 to 8 feet long, and shipped to Chicago.

"In the old days the limestone company would let us have the rock free, provided we pay the handling and freight. Now, however, they make a charge for the rock as well, all in all it costs us about \$5 a ton, or perhaps \$30 or \$40 per rock, to get it in place."

Up at the freight yard near Irving Park Road, we learned, the blocks are lifted onto flat trailers, two to a load, and hauled over to the lake front where another crane unloads them. When warm weather comes and the ice has melted, they will be set in place back of the steel bulkhead which holds the soil in place and rises only about 5 feet above the water level. Sometimes, where there is a strong current, they are sunk in the water in front of the bulkhead, where they form what is

known in breakwater circles as riprap.

So far as the park district knows, none of the blocks has ever been stolen.—Courtesy of "A Line O' Type or Two," *Chicago Tribune*.

*

While most of the Chicago breakwater stone now comes from the Bedford quarries around Bloomington, Indiana, stones for this purpose and for riprap have been barged up the old "I & M Canal" (built in 1848), and later on the Lakes-to-Gulf Waterway, for almost one hundred years, from the huge quarries scattered along the canal all the way from Joliet to Lemont. It has been less than two years ago that these operations ceased when the last quarries were closed and flooded at Lemont.

These Lemont quarries were one of the most prolific sources of Trilobite fossils to be found anywhere in the middle west, and were well known to rockhounds of the region, who visited them frequently.—EDITOR.

TOURIST STRIKES IT RICH!

ROCKHOUNDS everywhere were thrilled last month when they read (3/4/'56) about a lady tourist, Mrs. A. L. Parker of Dallas, Texas, finding a 15½ carat diamond in Arkansas, at a tourist mining concession known as the "Crater of Diamonds" mine, located near Murfreesboro. This, as most of us already know, is not a real diamond mine, but is however the only place, so far as is known, where diamonds have been found in situ, anywhere in North America.

Here, for a nominal fee, said to be about \$2.00, anyone desiring to do so may obtain permission to enter the property and hunt for diamonds to his heart's content—much the same as one may be allowed to pan for gold in Georgia, Colorado and many other places. The would-be diamond miners are allowed to keep whatever they find, provided they pay the owners 25 per cent of the actual appraisal value of the take. In this instance the stone was estimated, it is said, to be worth about \$15,000—figure it out for yourselves, a pretty good day's work, we would say.

Arkansas has the distinction of being the only state in which diamonds have been found in any appreciable quantity. They were first found in Pike County in 1906, and their discovery raised no end of excitement, but the yield has never been great enough to justify extensive mining opera-

tions. With greater capital, and bigger and cheaper earth moving machinery, it is yet hoped by some geologists that the time may come when this will be possible. At the present however, the "Crater of Diamonds" is only a rockhounds' playground.

Yes! There are Diamonds in Arkansas!

MAN AND MASTODON IN MISSOURI

(Continued from page 7)

knives etc. . . . Also between the rocks that had sunk through the ashes, was found large pieces of skin, that appeared like fresh tanned sole leather, strongly impregnated with the ley (sic) from the ashes, and a great many of the sinues and arteries were plain to be seen on the earth and rocks, . . . (they) are now preserved in spirits."

The pamphlet of 1843 is essentially the same as that of 1839 but does not mention the perishable materials and gives the additional information that the excavation was within 300 yards of the Bourbeuse River.

The second excavation in which Mr. Koch found evidences of human artifacts was in Benton County, Missouri. This was on the Pomme de Terre River about ten miles upstream from its juncture with the Osage River. Mr. Koch named the animal whose bones he dug up at this place, the "Missourium" and writes about their excavation: "There was embedded, immediately under the femur, or leg bone, of this animal, an arrow-head of rose colored flint, resembling those used by the American Indians, but of a larger size." Four more arrow-heads were found at the same horizon five or six feet away; three of similar workmanship and the fourth very crude. He states: "I examined the deposit in which they were embedded, and raised them out of their embedment with my own hands."

Mr. Koch then described the "stratum on which the river flowed at the time" of the "Missourium" as the upper green sand. Above this the deposit of the skeletal remains, next a "brown alluvium of the Eocene region . . . composed of vegetable matter of a tropical production—it contained all the remainder of the skeleton." These vegetables consisted of "cypress burs, wood and bark, tropical cane, ferns, palmetto leaves, several stumps of trees, and even the greater part of a flower of the strelitza class, which, when destroyed was not full blown. . . . These various matters had been torn up by their roots and twisted and split into a thousand pieces, apparently by lightning, combined with a tremendous tempest or tornado." He then describes the overlying beds, placing some in the "Eocene region" and some in the "Pliocene region." In the center of the deposit was a large spring which was never affected by rainy or dry weather.

The bones found in Jefferson County are de-

scribed as coming from "the land of Captain Palmer & Co., about 22 miles south of St. Louis." Mr. Koch described these in the *St. Louis Com. Bulletin* of June 25, 1839. His article was reprinted in the *American Journal of Science*, Vol. 37, 1839. Koch does not mention the association of human artifacts with the bones he found at this place. However, at a later date, better evidence of such an association has been reported from this, than any other place in Missouri. It is, no doubt, the place now referred to as the "Kimmiswick Bone Bed." This bone bed has been examined by trained scientists a number of times, the most recent investigation being by R. M. Adams. Mr. Adams found a point "only 40 centimeters above the tooth of an extinct *Bison occidentalis*, and on the same horizontal plane as the mandible of a mastodon." (1). He also found round blackened areas suggestive of fireplaces. However, he states: "concerning the indications that man was contemporaneous with the Mastodon the evidence is incomplete and tantalizing, but does tend to strongly suggest this contemporaneity." (2).

Following Mr. Koch's discovery and display of his large collection of bones, there was a great deal of scientific discussion about their size and structure, and speculation as to the possible new species represented. Scientists were also intrigued with the possibilities suggested by the artifacts associated with them. Some of their writings appeared in the *American Journal of Science*, others in the *Proceedings of the American Philosophical Society*, and still others in the *Transactions of the Academy of Science of St. Louis*. There were also many newspaper and magazine stories.

The present article is not primarily concerned with the exact species of animals whose bones were disinterred by Mr. Koch, but rather mostly with the evidence that man existed contemporaneously with the mastodon and other now extinct animals. Most of the scientists who examined the bones agreed that they belonged to some species of mastodon or other extinct animal such as the sloth and Zeuglodon, an extinct cetacean. Very few, if any of them, however confirmed Mr. Koch's "Hydrargos," "Hydrarchen," or "Hydrarchos."

In 1875, James Dwight Dana examined the evidence and articles presented by Mr. Koch and decided that they did not constitute *proof* of the contemporaneous existence of man and the mastodon. Such much of the proof depends upon Mr. Dana's reputation as a scientist it is well to state here who he was. Dana was professor of natural history and geology at Yale from 1850 to 1892, for a time he was editor of the *American Journal of Science and Art*, one time president of the American Association for the Advancement of Science, etc., etc. His name can be found in most encyclopedias and rosters of famous scientists. On the other hand, the only reference to Koch, found in the encyclopedias is in connection with the description of the Zeuglodon. The *Americana* (7) states: "A few years later a German collector named Koch collected great quantities of the bones and stringing

them together in some semblance of a natural skeleton, constructed a 'sea-serpent,' mostly neck and tail, no less than 114 feet long, which was exhibited widely in America and Europe, and required the exertions of eminent men (for example, Wyman, *Proc. Boston Soc. Nat. Hist.* November 1845) to expose as a humbug." Mr. Dana does not say that man could not have existed in America at that time, nor does he say that Mr. Koch was deliberately deceitful. He does, however, point out in detail, that Mr. Koch was not a trained scientist, or a competent observer. He shows how Mr. Koch uses geological terms in a way to indicate that he had no familiarity with them. Dana states: "All the pamphlets sustain the conclusion that Dr. Koch knew almost nothing of geology, and that what he gradually picked up from intercourse with geologists he generally made much of, but seldom was able to use rightly." (6).

Dana also quotes in detail, parts of Mr. Koch's description of the "Missourium" and points out that his knowledge of zoology was just as inaccurate as his knowledge of geology. Mr. Koch recognized the resemblance of the "Missourium" to an elephant but gave it webbed feet, solid bones without marrow, and a flat and broad tail apparently to show that it was an aquatic animal. Koch writes: "After having examined this subject in all its bearings, I have come to the conclusion that the leviathan—described in the 41st chapter of the book of Job—is none other than the Missourium here described, . . ." Dana then quotes from Richard Owen. ". . . the Missouri Leviathan, (which was) exhibited with a most grotesquely distorted and exaggerated collection of the bones in 1842 and 1843 in the Egyptian Hall, Piccadilly, . . . is now (1846) . . . an almost complete skeleton of the *Mastodon giganteous*, mounted in strict accordance with its natural proportions in the British Museum."

After pointing out that Koch's pseudo-scientific methods in his assemblage and description of the bones, show that he was not a competent observer nor a trained scientist, Dana then takes up the matter of the association of human artifacts with the bones. He says of the account of the arrow-heads found lying under the thigh bone of the "Missourium," "The observation and conclusion would have been more satisfactory had the author of them been a better observer." Dr. Edmund Andrews, in an article which appeared in a later issue of the *Journal* states that Prof. Hay contacted some of the men who helped Koch dig out the bones, and that these men said that they had worked in water and muck often groping for bones under water.

Of the account of the find in Gasconade Co., Dana points out that any fire built by man to kill a large beast would never have had a chance to reach the bones; that the Indians would have stopped the cooking and eaten the flesh long before the bones were charred. It is very possible that the bones were burned long after the animal died, by a brush or woods fire. Also concerning this find Dana says that the failure to repeat, in later accounts, the statement that skin and sinews had been found with the bones shows

that Koch, himself, was not sure of this part of his observations and his doubt of this observation also throws doubt on the other "observations" about the stone implements, etc.

Dana's account, which is given in much more detail in the references cited, proved to the satisfaction of most scientists that Koch's observations and statements could not be relied on, and therefore had not proved the contemporaneous existence of man and the mastodon in Missouri. Other scientists of that time who knew Mr. Koch personally for instance J. W. Foster (8) insist that he was truthful in his statements and really did prove that man existed at that time. None of them however, have much to say about the "Hydrargos," etc.

Since Koch's discoveries, there have been many finds of human bones and/or artifacts in ancient

evidence of man living in North America contemporaneously with now extinct animals has come to light. In 1935, men from the Smithsonian Institution found, in Larimer Co., Colorado, a Folsom point embedded in the vertebra of a large bison which was calculated, from other bones, to have stood seven feet tall at the shoulder. (5). In 1945, a point resembling both the Folsom and the Yuma type points was found partially embedded in the bone of a bison much larger than the modern buffalo. This, and 17 other points, were found in a bone bed near Plainview in Hale Co., Texas, by E. H. Sellards. They were studied and described by Alex D. Krieger, who named them Plainview type points. The deposit was dated as of Tahoka Age in the Pleistocene Epoch. (13).

A Clovis spear point has been found in the



WOOLLY MAMMOTH striding across a Pleistocene landscape in northeastern North America. Original water color painting by William C. Dilger of Cornell University. Kodachrome transparency of this painting may be obtained from Ward's Natural Science Establishment, Inc., Rochester, New York.

This picture of the Mammoth (restored) is not of the same species as the Mastodon referred to in the article, but is somewhat similar in appearance. The Mammoth also definitely lived contemporaneously with man during the late Ice Age in Europe, as is shown by excellent pictograph likenesses of same found in caves of Northern Spain and France. See article,—“Oldest Pictures in the World,” in issue of EARTH SCIENCE of July-August, 1954.—EDITOR.

gravel. (8), (10), (14). One, in Missouri, in the early 1930's, was a hematite axe, found in a gravel deposit near Newark in Knox Co., Missouri. This gravel bed also contained the bones of one, or more, mastodon. However, while the axe, when found, was partially coated with "blue clay" from the gravel deposit, it was not found in situ but rather on a pile of gravel which had been hauled some distance, and then dumped. (16).

None of these early findings could be authenticated to the satisfaction of the meticulous scientists. However, in the past few years indisputable

skull of a mammoth by University of Arizona archaeologists headed by Dr. Emil Haury near Naco, Arizona. Also this mammoth skeleton had five other points within the rib cage. At another place in Arizona, near Blackwater Draw, a Folsom point has been found among the bones of a Dire Wolf.

This last may not be considered undisputed proof, since the point was not actually found in a bone, but the bones with points actually embedded in them, found by competent scientists doing archaeological field work, is evidence which cannot be denied. It should be noted here,

that the Folsom and Clovis points are of a very distinct design and excellent workmanship. Points described by Koch as "resembling those used by the American Indian but of larger size" and "the fourth very crude" could not have been Folsom or Clovis type points.

There is then, definite proof that man lived in America at the time of now extinct mammals and therefore he may have lived in Missouri at that time, but as yet, no positive proof of this has been unearthed.

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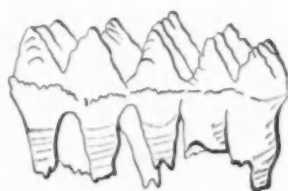


Fig. 1. Diagrammatic Sketch of tooth of the Mastodon Elephant.



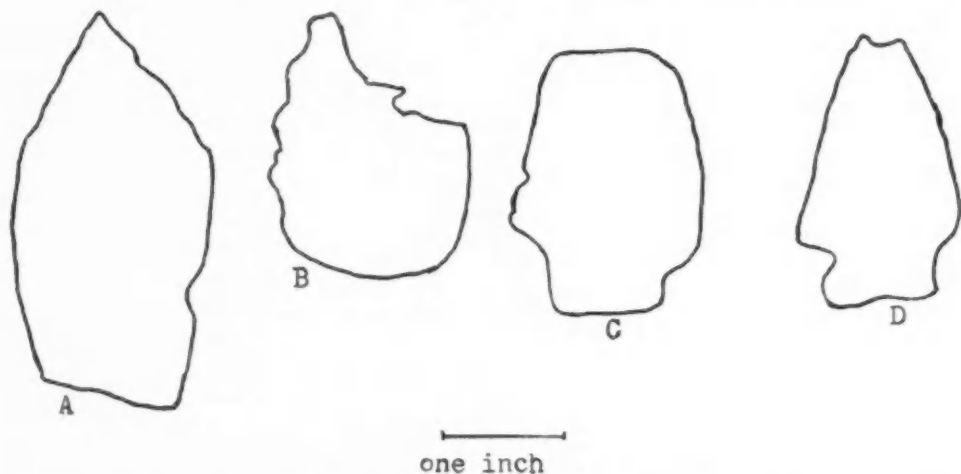
Fig. 2. Crown of Mastodon Tooth.



Fig. 3. Tooth of the Mammoth Elephant, showing plate structure, as compared with the Mastodon.

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Outline drawings of artifacts from Mr. Koch's collection. (After photograph by Gross). (17). Photographs of these were examined by Krieger and other midwestern archaeologists, and pronounced of Archaic age, about 5,000 years old. (Folsom points are about 10,000 years old.)

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Midwest Club News

BERNICE WIENRANK, *Club Editor*

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EVANSVILLE LAPIDARY SOCIETY'S program chairman, Harry Slater, on March 30 gave the group an interesting talk on "Pearls and Pearl Culture," and then surprised it by producing two tins of canned oysters! Lots were drawn and two lucky winners, Roy Gerard and Fae Maxedon, were awarded the task of opening the oysters, and keeping any pearls that they might find. When the cans were opened, it was evident, even before it was seen, that some marine life—or former marine life was present. The oysters had been preserved in formaldehyde because the heat of the usual canning process would have ruined any pearls present. With chisels, the pearl hunters pried open their bivalves and then gingerly prodded their fleshy interiors (pearls *au naturel* are not for the squeamish). Their faces brightened when pearls were discovered. A total of five beautiful little iridescent rounds, about three-sixteenths of an inch in diameter, was found. Roy recovered two pearls from his oyster and Fae found three.

CHICAGO LAPIDARY CLUB at its January meeting was transported back 250,000,000 years in time by Paleo-botanist Dr. Robert Whitfield, when he painted for it a vivid word-picture of the plant life that flourished during the time when the famous Mazon Creek fern fossils were being formed. Specimens of some of these plants are in existence today but are mere dwarfs compared to their ancestors.

CHICAGO ROCKS AND MINERALS SOCIETY on April 14 heard Walter C. McCrone, a consulting engineer associated with the Illinois Institute of Technology, speak on "The Formation of Crystals." With the aid of slides and movies made by microscopic photography, Mr. McCrone showed how crystals form.

CINCINNATI MINERAL SOCIETY heard Dr. William Jenks, head of the Department of Geology and Geography of the University of Cincinnati, give an illustrated talk on February 29, on "Prospecting by Helicopter in the Yukon." This project, Dr. Jenks said, marked the first time that a helicopter was used for prospecting in a mountainous area. The innovation enabled Dr. Jenks and his party to accomplish ten seasons of normal field work in one.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS on April 13 heard Professor Clarence Smith, physics instructor at Aurora College and co-author of "Earth and Sky," give an illustrated talk entitled "Knocking at the Doors of the Great Observatories." Dr. Smith described the famous, and some of the less-well known, observatories of the United States, their instruments and the work they do. He also told of the

important contributions made by amateurs in the field of astronomy.

NEBRASKA MINERAL AND GEM CLUB viewed pictures of ancient Mayan ruins, at its March 21 meeting. The pictures were shown and commented on by Mr. J. C. Van Avery, who recently returned from a tour of Central America. Mayan attainments in astronomy, art, architecture, hieroglyphic writing and their numeral system, have made them the wonder of the ancient New World.

GEOLOGICAL SOCIETY OF MINNESOTA has chartered a bus for a two-week field trip which will cover over 3,800 miles and take the group as far west as Mount Ranier. The party plans to visit a copper mine, a saw mill, Grand Coulee Dam, the eroded area made by the post glacial Columbia River, Mount Ranier, the Bad Lands, and many other historical, geographic and geologic places of interest. The travelers will leave St. Paul on July 14 and expect to be back home on July 28.

JOLIET MINERALOGISTS enjoyed an informative lecture on "Indian Artifacts" on March 22. The talk was presented by Frank Green, an amateur archaeologist, from Channahon, Illinois, who also displayed an assorted collection of Indian artifacts and demonstrated their various uses. Local Boy Scouts, dressed in Indian costumes, performed several Indian dances for the group.

WISCONSIN GEOLOGICAL SOCIETY on March 12 heard Elmer Rexin, of the Nunn Bush Shoe Company, lecture on "The Nunn Bush Well." This is one of the few wells in the world which acts as a seismograph. It has registered, by the rise and fall of its water, ninety-eight per cent of the earthquakes that have occurred in the last few years. Mr. Rexin has devised special recording equipment to keep tab on the well. On March 17 the group visited the well, which is near Milwaukee.

ISHPEMING ROCK AND MINERAL CLUB recently completed a ten-lesson course in geology. The two-hour classes were conducted by Geologist Richard Randolph, of the Cleveland Cliffs Iron Company. Dr. Tsui Ming Han, mineralogist and microscopist, was a guest lecturer.

INDIANA GEOLOGY AND GEM SOCIETY on April 13 held a clinic for ill-cut stones. Members were invited to bring their problem specimens—those showing pocked surfaces, internal fractures and/or poor color as a result of home treatment. A staff of consultants was on hand to determine the case histories of the stones, their reactions to certain treatments, and to give helpful information.

CENTRAL IOWA MINERAL SOCIETY met recently to view colored slides of the "Quartz Family Minerals." The series of 58 slides are instructive as well as entertaining and are highly

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recommended for either mineral or lapidary societies. They may be obtained from W. Scott Lewis, of Palm Springs, California.

NEWS OF OTHER SOCIETIES

MINERALOGICAL SOCIETY OF ARIZONA'S 17 year old junior member, Hershie Sue Fisher, was one of the top winners of the 1956 Science Talent Search, in which there were 20,828 participants. Sue was selected for her 1,000 word treatise on "Surface and Subsurface Water in the Salt River Valley with Especial Emphasis on Volume, Trends and Expectations." Johnny Rau, another junior member, recently discovered two unusual specimens, pseudomorphs of chrysocolla; one a pseudomorph after malachite, and the other a pseudomorph after cuprite.

NORTH LINCOLN AGATE SOCIETY will hold its 14th Annual Agate Show, July 29-30, in the Delake Grade School, on highway 101, Delake, Oregon.

SAN DIEGO LAPIDARY SOCIETY recently razed two old buildings, which it had purchased for a very low price, and salvaged much of the material for the club house that it plans to build on the lot it bought in 1955. After the wrecking session, the group built a fire on the ruins and held a wiener-roast.

CENTRAL TEXAS GEM AND MINERAL SOCIETY will hold its first annual show and sale, May 4-5, in the Garden Club Building, Abilene, Texas. Featured at this show will be Texas topaz, smoky quartz and other minerals from the Texas Llano Uplift.

FRESNO GEM AND MINERAL SOCIETY will be host to the California Federation of Mineralogical Societies' 17th Annual Convention, June 22-24. The exhibits will be housed in the Armory Building at the Fresno District Fairgrounds. Because the county of Fresno is celebrating its 100th anniversary this year, a centennial theme was chosen for the show. Informal dress of blue jeans and gingham will be in order. The California Federation conventions are famous for their outstanding gem and jewelry displays.

OKLAHOMA MINERAL AND GEM SOCIETY, via kodachrome slides, on May 3, was taken on a geologic tour of Western United States. Dr. W. Ham, of the University of Oklahoma, was narrator for the trip.

RECOMMENDED READINGS

"The Discovery of Crystallography," Anonymous, February issue of *The Template*. Abbe Rene Just Hauy's keen observation and intellectual curiosity led him to discover in the late 18th century, the principles of Crystallography.

"The Idol's Eye," by Agate Pete, February issue of *The Voice*. Another treat for admirers of Agate Pete.

"Believe It or Not—Coconut Pearls," by Dr. Frank Fleener, April issue of *M.G.A.* It is true, pearls, infrequently, are found in coconuts and some are of great value.

"Prospecting on the Moon," by Alice Wollin, March issue of *The Pick and Dop Stick*. Before you charter the next rocket to the moon, read this delightful dialogue.

(A mimeographed list of publications will be furnished on request by the Club Editor.)

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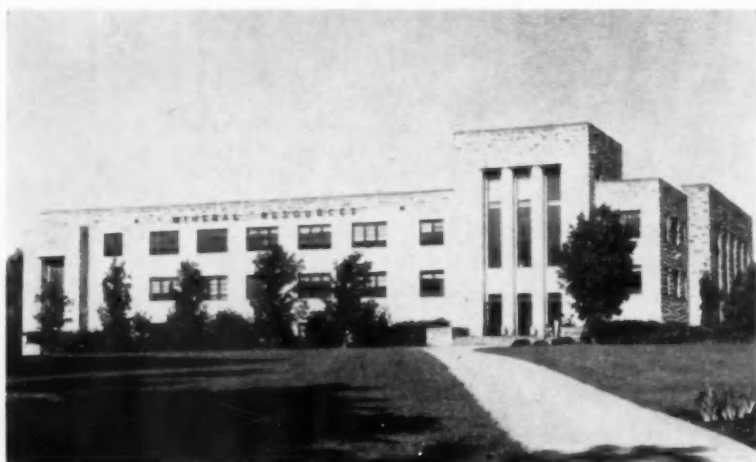
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Ferns Grew on Kilauea Volcano 2500 Years Ago

ABOUT 2500 YEARS AGO, it has been established by the Geological Survey, using the carbon-14 method for determination, an old fern forest grew on the northeast rim of Kilauea and was killed and buried under a layer of hot pumice and Pele's hair (fibrous, basaltic glass named for a mythical goddess). In excavating foundations near the Hawaiian Volcano Observatory, much charcoal from the old forest was found and sent to the Department for testing, at the

lava lake was formed, with eruptive fountaining. Pele's hair and pumice fell over the countryside, forming a deposit several inches thick a mile away from the crater on the windward rim, killing the forest. Downwind, in the Kau desert, pumice and glassy ash piled up more than 30 feet thick. Several small flows over the crater rim occurred.

Good specimens of Pele's hair (natural mineral wool if you please) it seems are now difficult to secure, and due to its unusu-



MINERAL RESOURCES BUILDING, home of the State Geological Survey, University of Kansas, Lawrence, Kansas. State Geological Survey offices and laboratories occupy most of the second floor and much of the first floor and basement of this three-story building, constructed in 1943 of Fort Riley limestone quarried near Silverdale, Kansas. Fort Riley limestone, largely of algal origin, occurs in Lower Permian rocks, in which many types of fossil algae may be found. Academic departments sharing space in the building (known on the campus as Lindley Hall) are geology, petroleum engineering, chemical engineering, mining and metallurgical engineering, geography, and astronomy. —(Photo by Ada Swineford, State Geological Survey of Kansas.)

laboratory in the Geological Survey.

It will be of interest to our readers to learn, according to Howard A. Powers, Survey geologist, that Kilauea was exceedingly active several thousand years before the birth of Christ, overflowing frequently to build the broad dome of the volcano. Then for a time activity slowed down and a caldera formed.

About 500 B.C., activity returned and a

al formation and origin it is greatly sought after by collectors who are familiar with its true nature. Perhaps we should add that the best way to obtain a specimen is to do a bit of "horse swapping" with some one on the Islands who not only knows where to find it, but also when to look for it.

—B.H.W.

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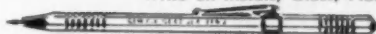


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AMATEUR "ROCKHOUNDS" FIND GEMS IN 48 STATES, FEDERAL MINES BUREAU SAYS

Ranging from the agate, which is the most widely distributed, to less common, but still plentiful, minerals like jade, opal, and zircon, native gem stones are found in all 48 States and Alaska. Some States, mostly those in the West, are better hunting grounds for gem collectors or, as they sometimes call themselves, "rockhounds."

The Bureau of Mines believes the weekend treasure hunts of these thousands of amateurs should be encouraged. Sooner or later, it feels, a casual search for turquoise or amethyst may lead to a "find" of an important strategic mineral such as manganese or nickel.

So far, no such discovery has been reported by a hobbyist, but as one Bureau engineer said: "With thousands of people out looking, the chances of uncovering a significant deposit certainly are increased."

Gem stones themselves are not difficult to find. A formation of rock or giant granite may conceal a treasure of topaz or tourmaline. Beach sands are a likely source of zircon and garnet, and the bed of a roadside stream may yield a cache of agates, sapphires, or jade.

A few years ago, one "rockhound" found a massive jade boulder in California, which, after cutting, was estimated to be worth about \$25,000.

Gem-stone cutting is fast becoming a favorite with hobbyists of all ages. Many colleges and high schools offer lapidary courses and, with the relatively simple "cabochon" cut, little experience is needed to produce a beautifully polished stone for jewelry or display. Nearly all the gems fashioned from domestic minerals come from the home workshops of these amateur lapidaries, the Bureau reports. Commercial firms supply only a fraction of the total output.

This, too, is fortunate, Bureau spokesmen feel. In an emergency, they say, the skills and equipment acquired in this hobby conceivably could be used to help expand production of jewel bearings and other items vital to defense.

A new "Glossary of Geological Terms," which will be found to be unusually valuable to earth scientists, has been prepared by William Lee Stokes and David J. Varnes, and published as Volume 16 of the Colorado Scientific Society, 1955. (Peerless Printing Company, Denver. Paper \$2.75, Cloth \$3.50.) This volume is primarily intended to provide civil engineers and specialists in related fields with a compact glossary of terms found in the speech and writings of geologists. Somewhat technical, the style is semi-encyclopedia, but nevertheless will prove interesting and useful to the non-professional geologist reader. The glossary contains 2,670 entries. Only the most general and elementary terms in mineralogy and paleontology are included. The principal zoological groups commonly found as fossils are briefly described as are the chief rock-forming minerals. The table of "Literature Cited" will prove a valuable reference, and we recommend the volume for the library of any serious student of the earth sciences.

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Again, mineralogists are often told that iron is never found free or in its native state in nature, due to its great chemical affinity for the omnipresent element oxygen, with which it so readily unites to form a variety of compounds (oxides).

More mature students, however, soon become aware of the truth of that old adage "There may/must be some exceptions to all rules," and this apparently is true in the case of the above inferences. For instance, we believe, Ninninger lists some four or five known meteorites which are entirely iron-free; and furthermore, some of the ultra-basaltic rocks on the "Laurentian Shield" of Canada (and elsewhere) are known to contain minute globules or specks of native iron.

Other notable exceptions to this rule also are found in basalts, whose occurrence is associated with certain lava extrusions near Oviak, Disco Island, Greenland. In the Chicago Natural History Museum, there may be seen our specimens of "Terrestrial Iron Containing Nickel," from this locality, each weighing respectively, marked and numbered, (1) 861 grams; (2) 2,225 grams; (3) 1,931 grams, and (4) 817 grams. Their composition is carded as: Iron 92%, Nickel 2%, Carbon 2%, "Basalt Containing Nickeliferous Iron, Oviak." In the same collection there is also a specimen of "Oxidized Nickel-Iron." from "Santa Catharina, San Francisco do Sul, Brazil, (iron 64%, nickel 34%), wt. 2,579 grams. From its composition, however, this may possibly have been of meteoric origin.

In the collection of Russell A. E. Morley*, of Salem, Oregon, reposes what is said to be the largest known mass of native iron—a nodule weighing 5,481 grams, found in basalt from Buhl Mountain, Germany, showing typical ellipsoidal character. The second largest known mass of 4,331 grams, from the same locality, reposes in the collection of the department of mineralogy, of the British Museum. Another mass weighing 1,143 grams is also pictured and described in the same article.—B. H. W.

*Consult article on page 20-21, of the July-August, 1954, issue of EARTH SCIENCE, by Russell A. E. Morley.

GRATEFUL FOR GUANO

In Japan, villagers of Kaminoise have dedicated a hospital to the memory of bats. The bats had inhabited a cave in the mountains above the village for centuries. Opened recently, the cave yielded tons of fertilizer that the villagers sold for hundreds of thousands of yen.

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TITANIUM PRODUCTION TECHNIQUES DESCRIBED

Methods employed by the Government in producing more than half a million pounds of titanium—one of the new "wonder metals" of the postwar period—are described in a Bureau of Mines report released by Secretary of the Interior Douglas McKay.

The publication tells of operations at the Bureau's pilot plant at Boulder City, Nevada, when research and development work on the strong, corrosion-resistant, lightweight metal was needed by the Army and when Government production was required to supplement industry's output.

Secretary McKay pointed out that the report goes into greater detail than most of its type because it attempts to cover the many questions asked by scores of engineers and business men who visited the plant to study its operation.

Using what is described as a modified Kroll process, the Bureau encountered many new problems in operating on a continuous basis. One was the prevention of leaks in equipment, since an unwanted opening as small as a pinhole could ruin an entire batch of sponge titanium.

The report covers every phase of the plant's design and operation. It tells of the precautions taken against fire and poisonous fumes, and describes every step in the production and purification of sponge metal.

Companies considering or already committed to producing titanium sponge are expected to find many useful ideas in the report.

A copy of R. I. 5141, "Titanium Plant at Boulder City, Nevada: Its Design and Operation," by C. T. Baroch, T. B. Kaczmarek, W. D. Barnes, L. W. Galloway, W. M. Mark, and G. A. Lee, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pennsylvania. It should be identified by number and title.

A map showing known uranium deposits of the United States has been prepared by the Geological Survey on behalf of the United States Atomic Energy Commission, Secretary of the Interior Douglas McKay has announced. Studies in recent years have shown that although trace amounts of uranium occur nearly everywhere under extremely varied geologic conditions, concentrations large enough to warrant mining are restricted. Principal uranium deposits in the United States are located in sandstone of the Colorado Plateau in Arizona, New Mexico, Colorado, and Utah, as well as in limestone in New Mexico. Important deposits in sandstone are also found in South Dakota and Wyoming marginal to the Black Hills, and in other areas of Wyoming. Plotted on the map are locations of the more important uranium deposits in continental United States, based upon information gained from published and unpublished reports of the Atomic Energy Commission, its contractors, and the Geological Survey. Included are discoveries by private individuals, corporations and Government agencies. Copies may be ordered by mail at 50 cents each from Geological Survey Distribution Centers at Washington 25, D. C., and Federal Center, Denver 2, Colorado.

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